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ing the ovaries, frequently transforming a whole spikelet into a solid mass of spores enveloped in a whitish to buff-colored tegument. The lower lateral solitary spikelets, when attacked, are changed into irregular roundish knots, or nodules, as large a medium sized pea. Spores roundish, oblong, oval or ovate and variously compressed; contents pale olivaceous, epispore smooth, reddish brown; general color of spore a bright warm brown, slightly olive tinged, 6-10 μ wide, by 6-14 μ long. J. B. ELLIS and F. W. ANDERSON.

REVIEWS OF RECENT LITERATURE.

KELLERMAN, W. A., AND SWINGLE, W. T.—*Preliminary experiments with fungicides for stinking smut of wheat.* Bulletin No. 12.—August, 1890. Botanical Department of the Experiment Station, Kansas State Agricultural College, Manhattan, Kans.

The wisdom of the recent establishment of State experiment stations by the General Government has been called in question in certain quarters. Nevertheless, the stations are here to stay, and their public usefulness becomes more and more apparent, especially after reading such a paper as this from the Kansas station. The results are striking and conclusive, and worth more to the wheat-growers of this country than the cost of all the stations.

In the main these experiments are a repetition and confirmation of those made in Europe by Jensen, Kühn, and others. Fifty-two treatments were given for the prevention of stone smut in wheat (*Tilletia*). The substances experimented with were:

Hot water of various temperatures; lye of different strengths; solutions of copper sulphate with and without lime, and of different strengths; Bordeaux mixtures, full and half strength; eau celeste; solution of sodium hyposulphite, with and without lime, and of different strengths; solution of potassium sulphide, with and without lime, and of different strengths; arsenic; lime; salt; soap; cistern water; chloroform; ether; sulphurous oxide; carbon bisulphide; ammonium hydrate; carbolic acid; sodium sulphate, bicarbonate and carbonate; potassium bichromate; mercuric chloride, and salicylic acid.

Fifty untreated strips, alternating with the treated ones and containing a total of 6,227 square feet, afford the basis for comparisons. The total heads produced on these 50 plats were by actual count 122,432, of which over seventy-one per cent. were smutted. The highest per cent. of smutted heads on any plat was 81.61 per cent.; the lowest was 53.54 per cent. The average number of bushels of sound grain per acre (calculated) on 41 of these plats is only 4.68. By an oversight no calculation was made for the other nine plats, but these were much like the rest, and the average of the fifty could not have varied much from that here given.

Undoubtedly the yield was smaller and the per cent of smut greater owing to the fact that the grain was sowed in November and made a slow and feeble autumn growth. In this connection it is interest-

ing to note that the per cent of smut was greatest on the latest sowings as the experiments of Brefeld would lead us to expect. The wheat was soaked in the fungicides or subjected to their vapors in case of chloroform, etc.

The experiments which proved most successful were as follows:

- No. 13. Hot water 131-132° F., 15 minutes. Smutted grains skimmed off.
- No. 15. Hot water 132-131° F., 15 minutes. Smutted grains not skimmed off.
- No. 21. Copper sulphate, 8 per cent., 24 hours; not limed.
- No. 23. Copper sulphate, 8 per cent., 24 hours; limed.
- No. 25. Copper sulphate, 5 per cent., 24 hours; not limed.
- No. 27. Bordeaux mixture, 36 hours.
- No. 29. Bordeaux mixture, half strength, 36 hours.
- No. 45. Arsenic, saturated aqueous solution, 24 hours.
- No. 57. Copper sulphate, $\frac{1}{2}$ per cent. solution, 24 hours.
- No. 87. Potassium bichromate, 5 per cent. solution, 20 hours.

The following table shows at a glance what has been accomplished:

Plot.	Heads smutted.	Bushels of sound grain (calcu- lated.)
	<i>Per cent.</i>	<i>Per acre.</i>
Average of the untreated.....	71.29	4.68
No. 13.....	0.13	14.37
No. 15.....	0.82	15.36
No. 21.....	0.36
No. 23.....	0.31	12.52
No. 25.....	0.00	13.54
No. 27.....	0.00
No. 29.....	0.06
No. 45.....	1.09	13.75
No. 57.....	0.74
No. 87.....	0.00	17.01

The authors recommend the Jensen or hot-water method as the best on the whole. This treatment did not destroy quite all the smut, but it killed none of the wheat grains, and gave the largest yield except No. 87, which was only a small plot. Full directions are given for making this treatment.

The bulletin shows evidence of unusual care in preparation and a visit to the station during the progress of the experiment led me to believe that particular attention was given to all the details of the experiment, which is one involving a very great amount of painstaking labor.

The graphic illustrations deserve special commendation.—ERWIN F. SMITH.

NEW SPECIES OF UREDINEÆ AND USTILAGINEÆ.

By J. B. ELLIS AND B. M. EVERHART.

SCHRÆTERIA ANNULATA, n. s. In ovaries of *Andropogon annulatus* from India (Herb. of S. M. Tracy). Mass of spores brownish black, pulverulent. Spores in twos or occasionally in threes, flattened on the line of contact, hyaline and 12-15 μ diameter at first, becoming brown and separating into two distinct spores 7-10 μ diameter. Epispore smooth or nearly so.